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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
U.S. EXPRESS MAIL, RESPONSE TO: June 21, 2004 OFFICE ACTION
(MAILED June 21, 04) APPLICATION # 10/733,968
ART UNIT 3661 **EXAMINER: GARY CHIN**

To: Commissioner of Patents and Trademarks
Gary Chin, United States Patent Examiner
Art Unit: 3661
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I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient Express Mail postage in an envelope addressed to: Commissioner of Patents and Trademarks, Arlington, VA, 22313. Express Mail # ER925886299US

Mailed on: Sept. 15, 2004

Harold R. Pilley
By Harold R. Pilley

Dear Examiner Chin,

I am responding to the 07/21/2004 Office Action. The actions related to this office action response are summarized below:

1. The applicant's abstract is not clear and concise. To address the examiner's comment a new abstract is provided on a separate sheet.

2. The applicant addresses the examiner's claim rejections in resubmitted claims (4 to 6). Clean claims and mark-ups are provided.

3. The examiner rejects claims 1-3, reason prior art 35 USC – 102. The applicant will address the examiners rejection by showing the applicant first developed the claimed concepts, then physically demonstrated them in public to the United States Federal Aviation Administration, at Manchester New Hampshire Airport.
The 10/733,968 application, the subject of this office action, contains the same specification as the 5,867,804 patent, hence includes no new specification material and is therefore based on Document Disclosure # 360870 dated 09/02/1994 . The applicant understands that a Terminal Disclaimer maybe necessary to overcome cited 102 rejections.

4. The applicant understands the examiner's comments. The cited prior art of Shiomi shows a priority date later than that of Pilley. Pilley first developed and then demonstrated the herein claimed invention to the United States Federal Aviation Administration prior to the priority date of Shiomi.

5. The applicant will show that the 5,548,515 parent application of this application and Document Disclosure material predates all cited references.

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Harold R. Pilley
Applicant

RESPONSE TO EXAMINER:

The applicant is responding to the June 21, 2004 Office Action of Examiner Gary Chin.

Examiner Item 1: The applicant is required to correct the abstract.

Applicant's Response: A new abstract is provided on a separate sheet as part of this office action response.

Examiner Item 2: Claims 1-3 are rejected under 35 USC 112, second paragraph as being indefinite for failing to claim the subject matter which the applicant regards as the invention.

Applicant's Response: Please cancel without prejudice Claims 1 – 3. The applicant understands the examiner's comment and provides amended claims 4-6. Clean Claims are provided on separate sheets.

In the Claims:

4. An airport navigation method for a plurality **of** vehicles selected from the group comprising aircraft and surface vehicles, said method comprising;
    a. installing a **[GPS]** **GNSS** reference antenna at a known physical location, said physical location being **[GPS]** **GNSS** referenced;
    b. preparing a**[n]** **[airport]** **digital** map that is **[GPS]** **GNSS** referenced; said map containing at least one digital representation of features selected from the group comprising runways, taxiways, gate areas, geographical features of the area surrounding the airport, topography surrounding the airport, approach paths, departure paths and identified obstructions;

c. providing said map to a vehicular navigation computer system;

d. receiving **[GPS]** **GNSS** signals at said **[GPS]** **GNSS** reference antenna;

e. providing said received **[GPS]** **GNSS** signals to a Differential **[GPS]** **GNSS** base station;

f. calculating **the differential corrections in** **[with]** said Differential **[GPS]** **GNSS** base station **[differential corrections]**;

g. providing said differential corrections to a radio transmitter;

h. broadcasting using said radio transmitter, said differential corrections to **[said]** **a** vehicle **of said plurality of vehicles;**

i. receiving using a radio receiver located on said vehicle said broadcast differential corrections;

j. receiving GNSS signals using a GNSS antenna located on said vehicle and providing said received GNSS signals to a differential GNSS receiver located on said vehicle;

k. providing said received differential corrections to said differential **[GPS]** **GNSS** receiver;

l. calculating using said differential **[GPS]** **GNSS** receiver at least one differentially corrected **position; [information element selected from the group comprising 3-dimensional position, 2-dimensional horizontal position, vertical position, 3-dimensional velocity, speed, heading, vertical rate and time]**

m. navigating said vehicle using said differentially corrected **[information]** **position** using said vehicular navigation computer system that displays said location of said vehicle on said digital map.

5. An airport control and management method for a plurality vehicles selected from the group comprising aircraft and surface vehicles, said method comprising;

a. installing a **[GPS]** **GNSS** reference antenna at a known physical location, said physical location being **[GPS]** **GNSS** referenced;

b. preparing a**[n]** **[airport]** **digital** map that is **[GPS]** **GNSS** referenced; said map containing at least one digital representation of features selected from the group comprising runways, taxiways, gate areas, geographical features of the area surrounding the airport, topography surrounding the airport, approach paths, departure paths and identified obstructions;

c. providing said map to an airport control and management computer system;

d. receiving **[GPS]** **GNSS** signals at said GNSS reference antenna;

e. providing said received **[GPS]** **GNSS** signals to a Differential **[GPS]** **GNSS** base station;

f. calculating **the differential corrections in** **[with]** said Differential **[GPS]** **GNSS** base station **[differential corrections]**;

g. providing said differential corrections to a radio transmitter;

h. broadcasting using said radio transmitter, said differential corrections to **[said]** **a** vehicle **of said plurality of vehicles;**

i. receiving using a radio receiver located on said vehicle said broadcast differential corrections;

j. receiving **[GPS]** **GNSS** signals using a **[GPS]** **GNSS** antenna located on said vehicle and providing said received **[GPS]** **GNSS**

signals to a differential **[GPS]** **GNSS** receiver located on said vehicle;

k. providing said received differential corrections to said differential **[GPS]** **GNSS** receiver;

l. calculating using said differential **[GPS]** **GNSS** receiver at least one differentially corrected **position; [corrected information element selected from the group comprising 3-dimensional position, 2-dimensional horizontal position, vertical position, 3-dimensional velocity, speed, heading, vertical rate and time;]**

m. broadcasting **said** differentially corrected position information indicative of said vehicle location using a radio transmitter located on said vehicle;

n. receiving said broadcast position information at said control and management computer system;

o. presenting said **[airport]** **digital** map on a display of said airport control and management computer system and

p. displaying the location of said vehicle in said presented **[airport]** **digital** map using said received broadcast position information.

6. An airport navigation system , the system comprising;

a. a **[GPS]** **GNSS** antenna used to receive broadcast signals from **[GPS]** **GNSS** satellites, said **[GPS]** **GNSS** antenna located at a known location, identified with 3-dimensional **[GPS]** **GNSS** compatible coordinates;

b. a differential **[GPS]** **GNSS** base station that receives **[GPS]** **GNSS** signals from said **[GPS]** **GNSS** antenna;

c. means within said differential **[GPS]** GNSS base station to calculate differential corrections consisting of pseudorange corrections;

d. a radio transmitter connected to said differential **[GPS]** GNSS base station;

e. means within said differential GPS base station to send **said** pseudorange corrections to said radio transmitter **for broadcast**;

f. a radio receiver located on a vehicle selected from the group comprising aircraft and surface equipment;

g. means on said vehicle to receive said pseudorange corrections using said radio receiver and means to provide said pseudorange corrections to an onboard differential **[GPS]** GNSS receiver;

h. means to calculate a differentially corrected position**, indicative of vehicle location** using said onboard differential **[GPS]** GNSS receiver and **[said]** received **said** pseudorange corrections; **[and]**

i. a computer with display for presenting a digital map of an airport and surrounding areas;

j. means to display said differentially corrected GNSS position in a digital map of an airport and

k. means to navigate said vehicle using said differentially corrected **[GPS]** GNSS position **presented on said display.**

Examiner Item 3: 35 U.S.C. 102 Claim Rejections:

The applicant understands the examiners rejection, but offers the following response:

The 10/733,968 application, the subject of this office action, contains the same specification as the 5,867,804 patent, hence includes no new specification material and is therefore based on Document Disclosure # 360870 dated 09/02/1994 . The chain of patent applications has been continuous and uninterrupted since patent 5,200,902. A patent application has always been pending.

Furthermore, the applicant points out that the combination of a digital map of an airport with autonomous GPS is contained in applicant's patent 5,200,902, the invention contained herein adds the component of differential GNSS to create a navigation system and or an airport control and management system. At the time when this invention was being developed (early 1990's), the applicant knew of no others performing this work.

The applicant feels that limiting the term of this patent with a Terminal Disclaimer overcomes the examiner's 102 basis for rejection.

Examiner Item 4: Cited References

The applicant provides the following response to the cited references:

Applicant's Response:

Shiomi et al. US Patent: 5,677,841

The invention of Shiomi in examiner's referenced claim 3 describes a control target system using a satellite system, determining differential data, transmitting differential data to control targets that perform compensation of said satellite data the using the differential data in obtaining the position data.

The applicant agrees with the examiner's interpretation of Shiomi Claim #3, but the key factor is; who has the earliest priority data and who first reduced the claimed invention to practice. The specification of application 10/733,968 (the subject of this office action) predates the priority data of Shiomi. Furthermore, the applicant demonstrated his system utilizing the invention claimed herein to the United States Federal Aviation Authority (FAA) in August of 1993, and conducted independent research utilizing differential GPS, and map displays prior to the 1993 demonstration to the FAA.

For the stated reasons above the applicant feels that Pilley should prevail over the teachings of Shiomi.

Murphy, US Patent: 5,786,773

The second reference cited, by Murphy employs a differential GPS system including GPS space satellites, multiple ground stations, multiple reference station antennas, a datalink transmitter for communicating reference station signals to aircraft that utilize the broadcast information for navigating the aircraft. The teachings of Murphy identify numerous enhancements to the concept of differential GPS. These include integrity enhancing anti-spoofing techniques,

multiple reference stations broadcasting on various frequencies and time slots, and novel processing techniques to reduce common mode errors in pseudorange correction information.

The reasons Pilley should prevail over the teachings of Murphy are the following: The specification of this application is based on late 1980's to early 1990's work of Pilley, hence pre-dating that of Murphy. The invention claimed herein includes an element of the Murphy invention (Differential GPS) which Murphy must use, but without the claimed enhancements of Murphy. The teachings of Murphy are silent on a key element of the Pilley invention, the digital map for use in the cockpit and at a controlling station. For these reasons the invention of Pilley and Murphy are for two different inventions. Murphy, a Differential GPS Reference Station, Pilley a Differential GNSS Navigation and Control system benefiting both the pilot and controller with differential GNSS precise maps and GNSS positions.

Pilley should prevail over cited art due to earlier priority dates and for reasons of being a different invention.

Farmakis et al. US Patent 5,714,948

The claimed invention of Farmakis et al, describe a satellite based air traffic control system that identifies tracked aircraft using a two transmission technique to provide aircraft identity and location (when GPS is available) to ATC after a first transmission is complete.

The claimed invention of Farmakis is a different invention from that of Pilley. The specification of Farmakis is silent on a GNSS compatible digital map for

showing the location of aircraft using differential GPS in the cockpit or at ATC. Pilley should prevail over Farmakis for the reasons stated above.

Class et al, US Patent 5,361,212

The teachings of Class et al. describes a landing system incorporating differential GPS. For the following reasons Pilley should prevail over the teachings of Class.

a. The teachings of Class are silent on the use of any airport map for cockpit situational awareness.

b. The teachings of Class are silent on the ability for Air Traffic Control to use Differential GNSS location reports for Air Traffic Control displays.

c. The teachings of Class integrate the GPS positions with an ILS landing systems while the invention of Pilley does not.

d. Early work of Pilley on differential GPS landings using ILS as a truth source predate the Class file date of November 2, 1992.

Clearly the claimed invention of Pilley is for a different invention than that of Class, since it involves a digital map for pilots and controllers and is not limited to landing as the claimed invention of Class. For these reasons, Pilley should prevail over the teachings of Class.

Anderson et al. US Patent: 6,694,249

My response to the cited prior art is as follows:

My book titled "GPS Based Airport Operations, Requirements, Analysis and Algorithms, was purchased by Rockwell International. The teachings in my book define the patented invention of Anderson years before the file date of this patent.

Clearly the elements of the claimed invention are all defined in my book. The book forms the basis for this application, the priority data for this application is the document disclosure #360870, dated September 2, 1994. The applicant understands that a Terminal Disclaimer may be necessary to limit the term of this patent to the term of patent 5,548,515.

Rockwell International purchased my book, ship date March 10, 1995. (Credit card slip available on request).

On June 15 of 1998, I personally with my counsel of Wiley, Rein and Fielding, met with personnel from Rockwell Collins, Cedar Rapids, IA to discuss my intellectual property. Kyle Eppele, who is the attorney of record on cited Haendel patent was the lead counsel for Rockwell, and Eppele, indicated Rockwell was not interested in my intellectual property after reviewing my materials, book and patents. Clearly, Rockwell knew about my technology, my book and patents, prior to this application file date. The invention claimed by Haendel was demonstrated and reduced to actual practice years prior to the file date of Haendel.

For the above reasons Pilley should prevail over Anderson, in fact I do not think Anderson is entitled to a patent based on prior art (the book, GPS based Airport Operations, Requirements, Analysis and Algorithms) which was in the hands of Rockwell, the Library of Congress and the United States Patent Office prior to the application being filed.

Rowson et al. US Patent 6,067,484

The invention of Rowson is for a Differential GPS reference system containing three or more GPS receivers. The invention of Pilley includes a differential GNSS reference station as an element, but in addition it includes a digital map for

situational awareness for the pilot and controller. The invention of Rowson does not. In addition, the three or more GPS receiver design of Rowson could be used as the Differential GPS source and when combined with the other elements of the Pilley invention support the Pilley invention claimed herein. The invention of Pilley can utilize many different sources of Differential GPS correction data (WAAS and LAAS for example) and is not limited to a GPS reference station containing three or more GPS receivers. The invention of Rowson builds on the prior art invention of Pilley by adding additional GPS receiver(s) to the one or two receiver design of Pilley as identified in Figures 30, 31, 32 and 33. The prior art book "GPS Based Airport Operations, Requirements, Analysis and Algorithms" of Pilley contains actual Differential GPS correction data used in differential GPS landings.

Patentability should be granted Pilley for the reasons stated above.

Haendel et al. US Patent: 6,208,289

The invention of Haendel filed on May 14, 1999 is predated by the applicants work. The applicants work involving multiple GPS receivers to perform a check on a differential GPS pseudorange corrections is well documented and was conducted in 1991 and 1992 in the conduct of differential GPS landing tests. The applicant's patent 5,867,804 illustrates in Figures 31 and 33 the concept. The applicant's book "GPS Based Airport Operations, Requirements, Analysis and Algorithms" (the basis for this application) predates the filing date of Haendel and clearly describes the patented concept of Haendel, using a differential GNSS receiver and a second receiver to "check" the differential corrections by performing a differential GNSS position solution at the second receiver and comparing it to a known antenna location.

Rockwell International purchased my book, ship date March 10, 1995. (Credit card slip available on request).

On June 15 of 1998, I personally with my counsel of Wiley, Rein and Fielding, met with personnel from Rockwell Collins, Cedar Rapids, IA to discuss my intellectual property. Kyle Eppele, who is the attorney of record on cited Haendel patent was the lead counsel for Rockwell, and Eppele indicated Rockwell was not interested in my intellectual property after reviewing my materials, book and patents. Clearly, Rockwell knew about my technology, my book and patents, prior to this application file date. The invention claimed by Haendel was demonstrated and reduced to actual practice years prior to the file date of Haendel.

The applicant understands that a Terminal Disclaimer may be necessary to limit the term of this patent to the term of patent 5,548,515. For the reasons stated above Pilley should prevail over the teachings of Haendel.

Castor et al. US Patent: 6,282,488

The invention of Castor provides a Surface Movement Guidance and Control System (SMGCS), but is missing a number of elements that are necessary for duplicating the invention claimed by Pilley. The invention of Castor does not specifically include: digital maps, the ability to transmit on board determined information to Air Traffic Control or the ability to plot a differentially corrected position in a digital map. Furthermore the book "GPS Based Airport Operations, Requirements, Analysis and Algorithms (filed as document disclosure # 360870, September 2,1994) predates priority data of Castor (February 29, 1996). For these reasons Pilley should prevail over Castor.

Haendel et al. US Patent: 6,501,424

The claimed invention of Haendel describes a differential GPS transmission system using HF radio for broadcasting and receiving differential GPS pseudorange corrections at an airborne receiver from multiple terrestrial HF transmitters. The HF radio system is used to improve the integrity and accuracy of a GPS receiver's position solution as other differential GPS systems with the exception that this invention specifically claims transoceanic aircraft as the sole receiver of such information. Hence is different from Pilley.

The specification of Haendel is silent on how the claimed separation is performed. Hence the teachings of Haendel can not be used to instruct those unskilled in the art how pilot situational awareness or controller surveillance functions are performed using a display showing the differential corrected GPS positions of aircraft. In addition, the teachings of Haendel are silent with respect to the digital map used to show the pilot and controller the relative positions of terrain and other air traffic.

It is conceivable that the radio broadcast invention of Haendel could be used to provide differential corrections in the airport environment claimed by Pilley, since the invention of Pilley is not necessary limited to one type of differential correction radio broadcast.

Since the subject pending application of Pilley is based on the book "GPS Based Airport Operations, Requirements, Analysis and Algorithms (filed as document disclosure # 360870, September 2,1994) it predates that of Haendel. The applicant understands that a Terminal Disclaimer may be required.

For the reasons stated above Pilley should prevail over the teachings of Haendel.

Pilley, US Patent: 5,574,648

To overcome the double patenting and prior art rejections the applicant understands a Terminal Disclaimer may be necessary to overcome the applicant's prior awarded patent.

Mueller et al. US Patent: 5,323,322

The invention of Mueller comprises a world wide differential GPS system incorporating ground based GPS reference stations, satellite uplinks and satellite DGPS down links. The concept is similar to the Wide Area Augmentation System. The invention of Mueller is for a different invention than that of Pilley. The teachings of Mueller are not for a situational awareness display capability for air traffic controllers, pilots and drivers. The invention of Mueller is silent on the use of Automatic Dependent Surveillance to provide air traffic control with precise differentially corrected GNSS position information displayed in combination with a digital map. Clearly the invention of Mueller could be used to provide a means of differential GNSS correction, but it lacks the elements to duplicate, predict or teach the invention herein claimed by Pilley. For these reasons, Pilley should prevail over the cited prior art of Mueller.

Pilley, US Patent 5,200,902

The 5,200,902 patent of the applicant is silent on the claimed elements of this pending application. The 5,200,902 patent is for a different invention involving autonomous GPS in combination with a 3-D map, the enhancement claimed herein is for differential GPS used in combination with a map display for use in the cockpit or at Air Traffic Control.

Pilley et al. US Patent: 5,867,804

To overcome the double patenting and prior art rejections the applicant understands a Terminal Disclaimer may be necessary to overcome the applicant's prior awarded patent. Any added figures contained in this application over the cited patent do not represent the introduction of new material relative to the claims stated in this pending application. The added figures are for enhancements not related to this invention. The important elements of this invention are contained in Figures 1, 22, 23, 24, 25,26, 28, 29, 30, 31, 32, 33 which were included in the applicant's 5,867,804 patent and contained in the author's referenced book.

Pilley et al. US Patent: 5,548,515

To overcome the double patenting and prior art rejections the applicant understands a Terminal Disclaimer may be necessary to overcome the applicant's prior awarded patent. The important elements of this invention are contained in Figures 22, 23, 24, 25,26, 28, 29, 30, 31, 32, 33 which were not included in the applicant's 5,548,515 patent.

In summary, Pilley should prevail over all cited references for the above reasons.